

# PS-22

Canadian Model  
AEP Model  
UK Model



Canadian Model

Cartridge is not supplied with  
this turntable system.

## FULL AUTOMATIC STEREO TURNTABLE SYSTEM

### SPECIFICATIONS

#### GENERAL

Power Requirements:	120 V ac, 60 Hz (Canadian model) 110, 120, 220, or 240 V ac adjustable, 50/60 Hz (AEP, UK model)
Power Consumption:	6 W
Dimensions:	Approx. 446 (w) x 140 (h) x 374 (d) mm 17 1/2 (w) x 5 1/2 (h) x 14 3/4 (d) inches
Weight:	Approx. 7.1 kg, 15 lb 10 oz (net) Approx. 8.1 kg, 17 lb 14 oz (in shipping carton)

#### TURNTABLE

Platter:	32.6 cm (12 7/8 inches) dia. Aluminum-alloy diecast
Motor:	DC servo-controlled motor (brushless and slotless)
Drive System:	Direct drive
Speeds:	33 1/3, 45 rpm
Pitch Control Range:	± 4 %
Wow and Flutter:	0.03 % (WRMS) ± 0.045 % (DIN)
S/N Ratio:	70 dB (DIN-B)

#### TONEARM

Type:	Statically balanced, universal
Pivot-to-Stylus Length:	216.5 mm, 8 1/2 inches
Overall Arm Length:	300 mm, 11 3/4 inches
Overhang:	16.5 mm, 2 1/32 inches
Tracking Error:	+3°, -1°
Tracking-Force Adjustment Range:	0 - 3 g
Shell Weight:	7.5 g
Cartridge Weight Range:	4 - 12 g

— Continued on next page —

#### SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

**SONY**  
SERVICE MANUAL

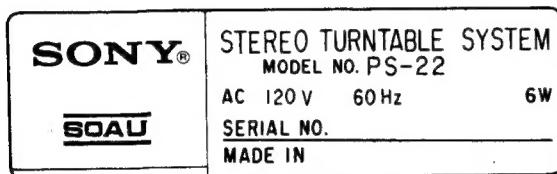
**CARTRIDGE (VL-32G) (AEP, UK model)**

**Type:** Moving magnet type  
**Frequency Range:** 10 – 30,000 Hz  
**Channel Separation:** 25 dB (1 kHz)  
**Output Voltage:** 3 mV (1 kHz, 5 cm/sec, 45°)  
**Load Impedance:** 50 kΩ  
**Tracking Force:** 1.5 – 2.5 g (2 g recommended)  
**Stylus:** Sony ND-134G  
(Conical 0.5 mil diamond)  
**Weight:** 5.5 g

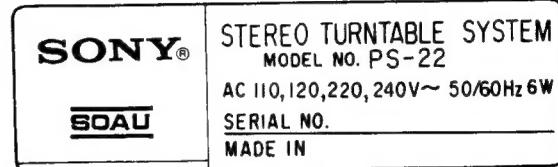
● **MODEL IDENTIFICATIONS**

— Specification Label —

Canadian model

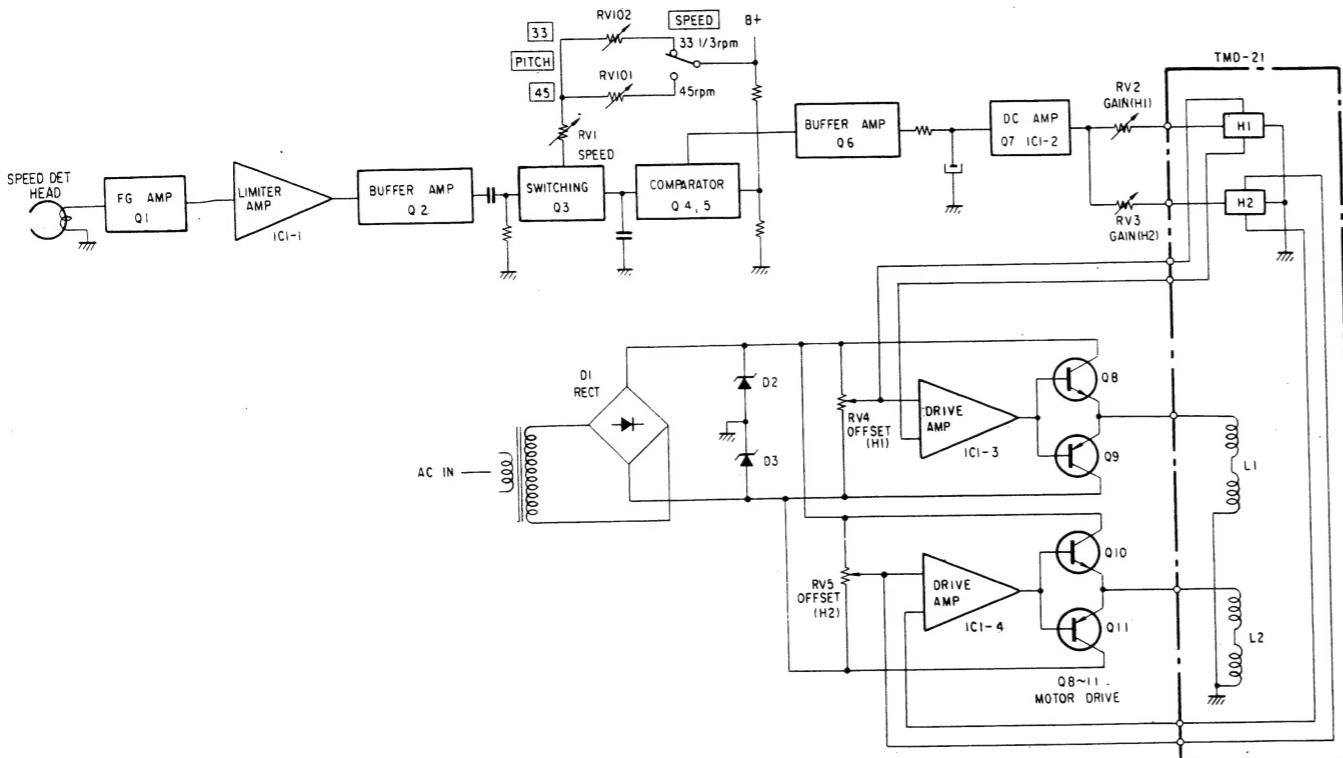


AEP, UK model



## SECTION 1 OUTLINE

### 1.1. BLOCK DIAGRAM



### 1.2. HALL MOTOR (TMD-21)

Adoption of the BSL (brushless and slotless) DC servo motor has the following major advantages.

- 1) Very little noise due to the elimination of mechanical contacts, and current control by electronic switching.
- 2) Stable performance and very long operational life.

The operating principles of the Hall Motor (TMD-21) are described below.

#### • Hall Element (VHE-510)

The magnetic field strength is converted into electrical signals by employing the Hall Effect \*

\* The Hall Effect: When a current (I) flows through a substance, and a magnetic field (B) is applied at right angles to the direction of current flow, a potential difference (V) will be generated in a direction at right angles to both the current and magnetic field. (See Fig. 1-1.)

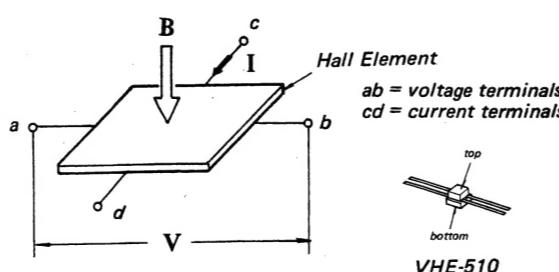


Fig. 1-1.

Note: There is no distinction between voltage and current terminals in the VHE-510 Hall Element.

#### • Motor Drive

The TMD-21 Hall Motor employs the Hall Element to detect the position of magnets. When an N pole is positioned opposite the Hall Element H1 in Fig. 1-2, a positive voltage is generated in H1. This voltage is then amplified in IC1-3, and then applied to Q8 after passing through R31. Once Q8 is turned ON, B+ voltage is applied to L1. The current flowing through L1, and the magnet's magnetic field, produce a magnetic force and rotates the rotor in the direction of the arrow.

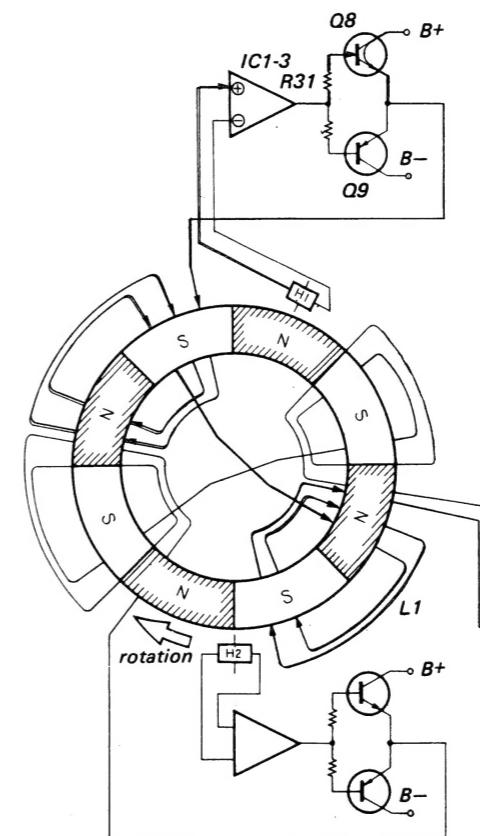


Fig. 1-2.

When the rotor rotates by  $22^{\circ} 30'$ , an S pole will be positioned opposite the Hall Element H2 in Fig. 1-3, thus resulting in the generation of a negative voltage in H2. This voltage is amplified by IC1-4, passed through R36, thus turning Q11 ON, and resulting in B- voltage being applied to L2. The current flowing through L2, and the magnet's magnetic field, produce a magnetic force, again in the same direction as before.

Therefore, N poles and S poles are repeatedly positioned opposite H1 and H2 Hall Elements respectively every  $45^{\circ}$  of a rotation, resulting in the generation of the voltages in H1, H2 which are used to produce the force required to rotate the rotor.

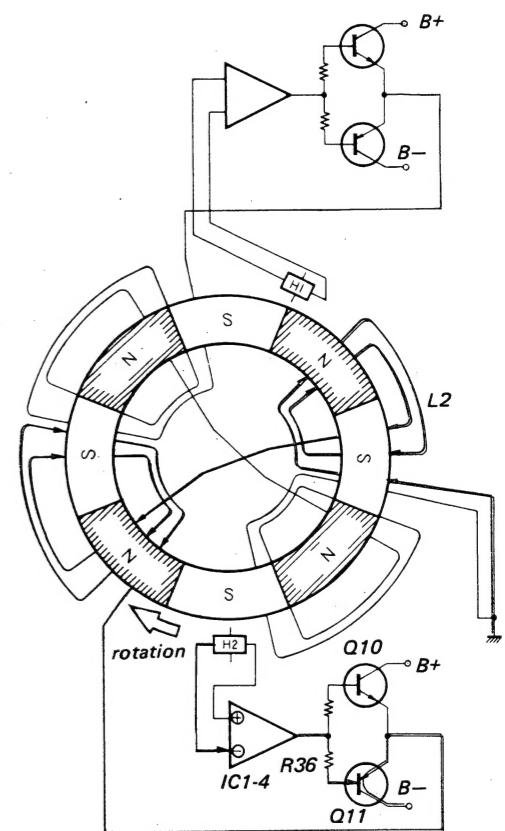


Fig. 1-3.

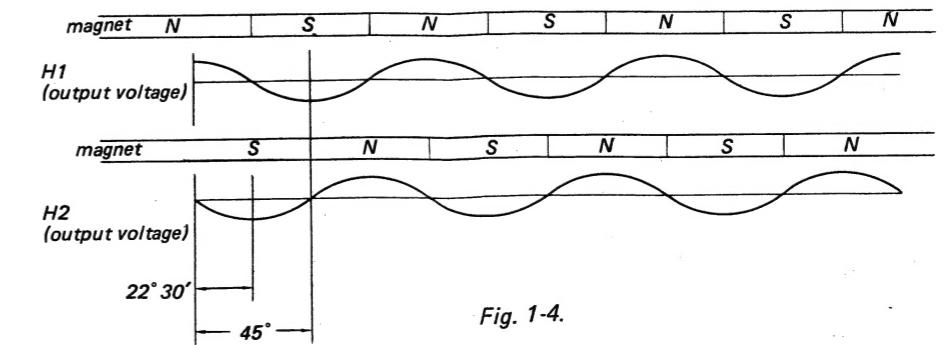
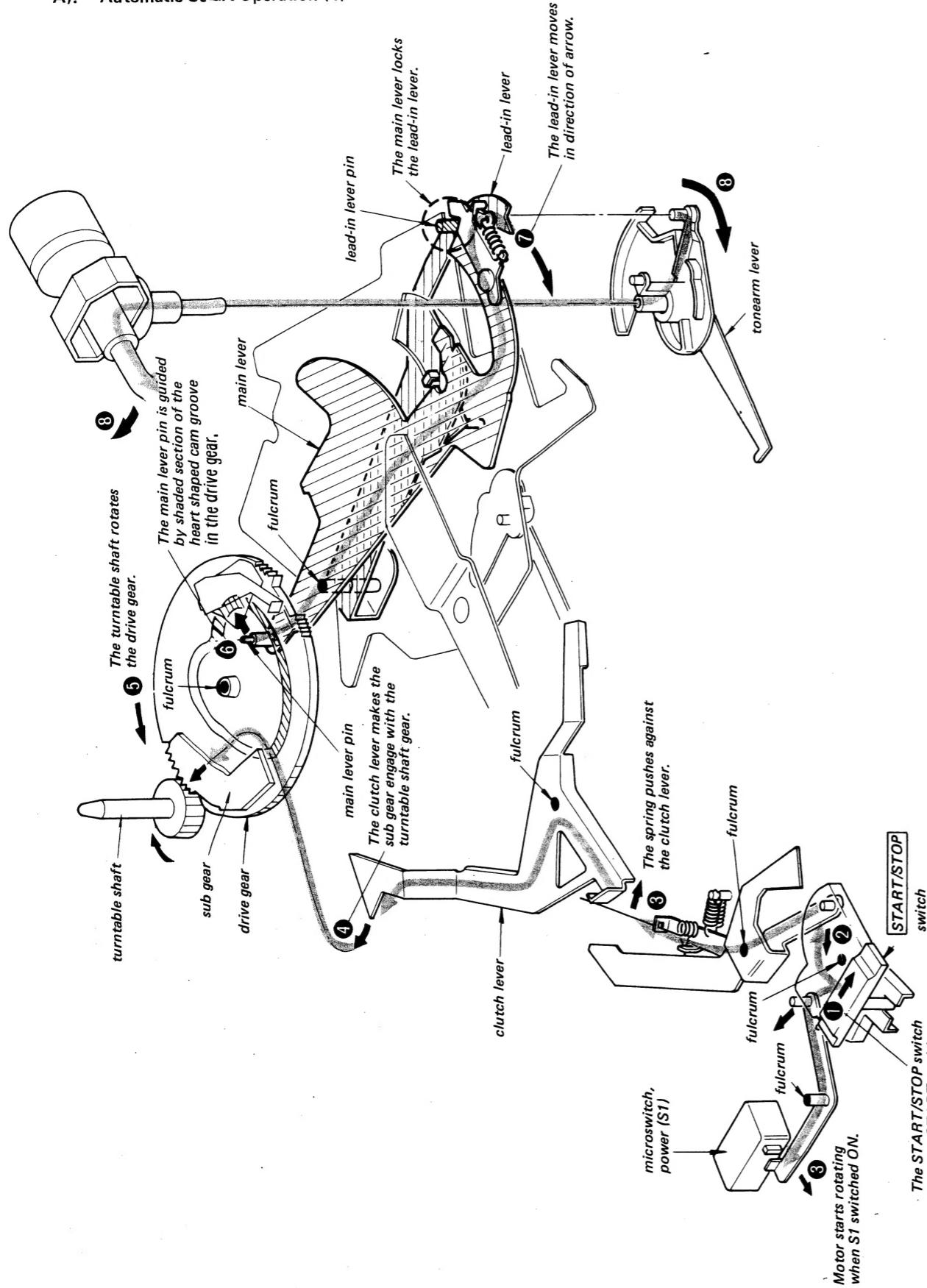


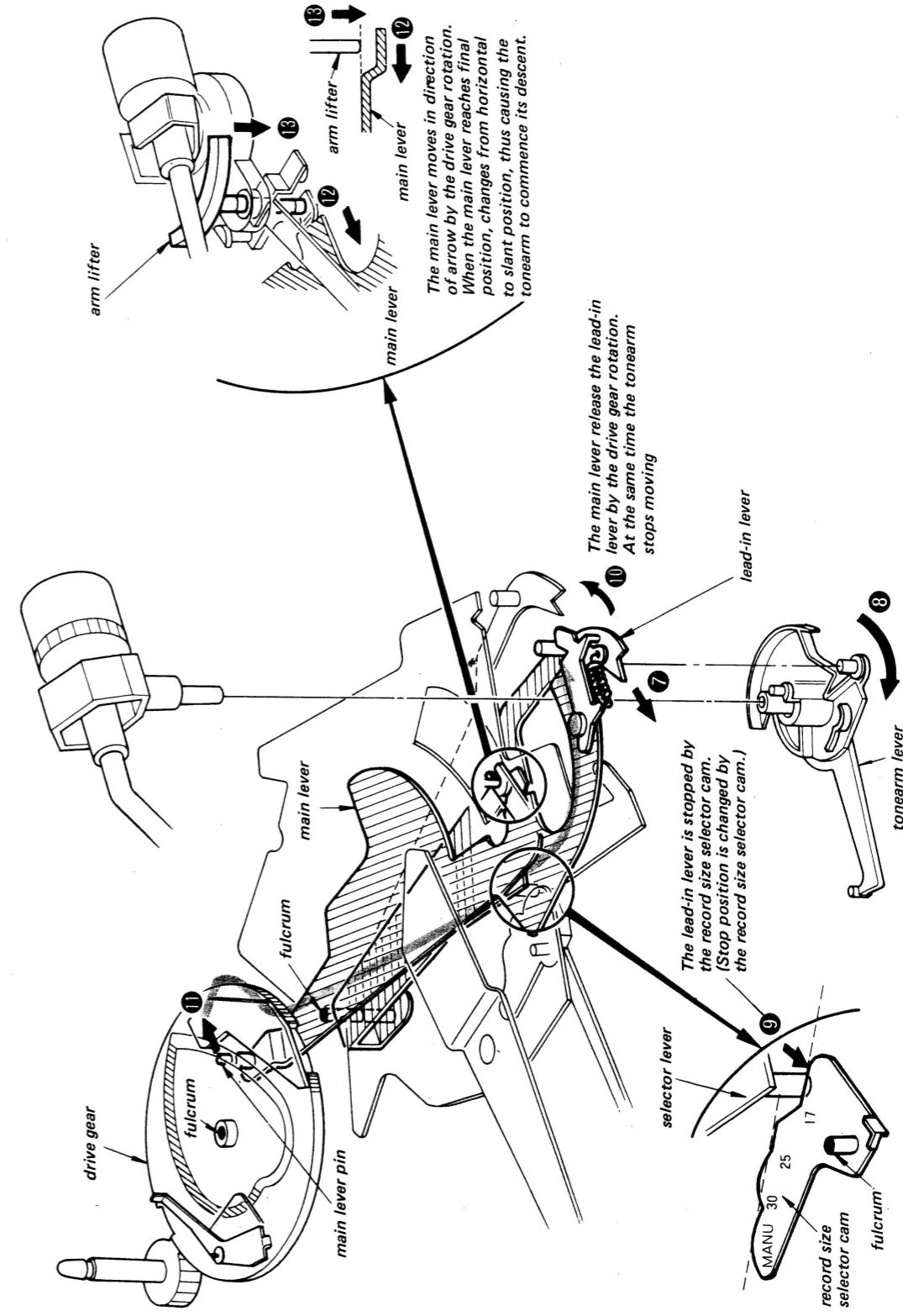
Fig. 1-4.

1-3. MECHANICAL OPERATION

A). Automatic Start Operation (1)

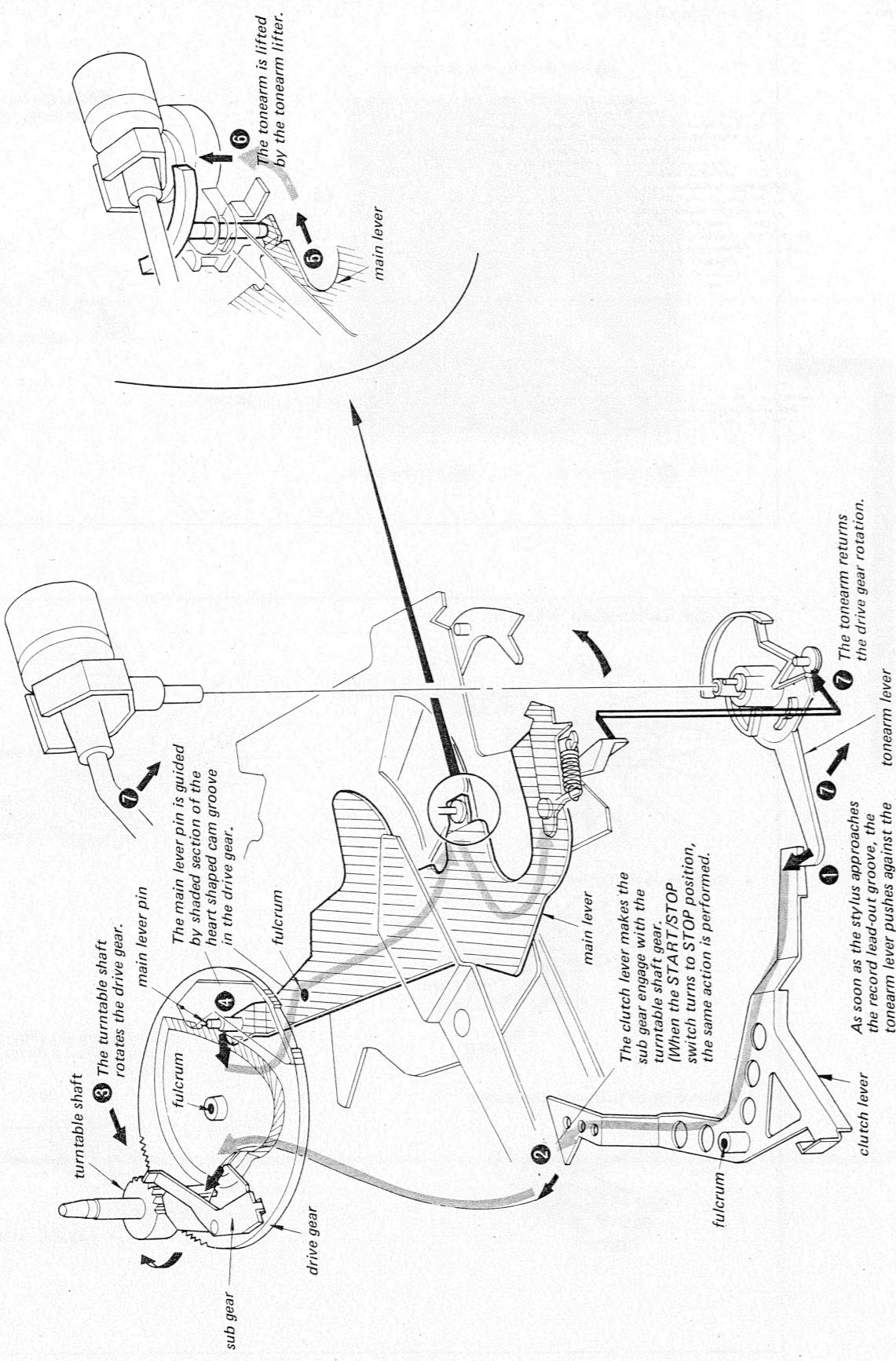


B). Automatic Start Operation (2)



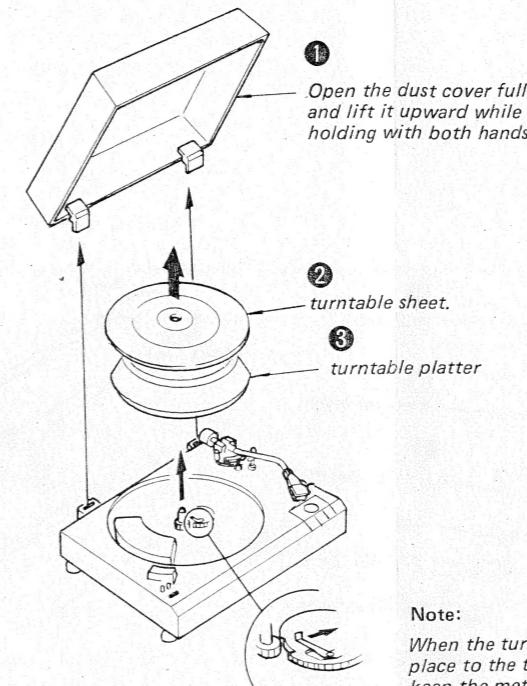
SECTION 2  
DISASSEMBLY

C. Automatic Return Operation



2-1. REMOVAL

Turntable Platter



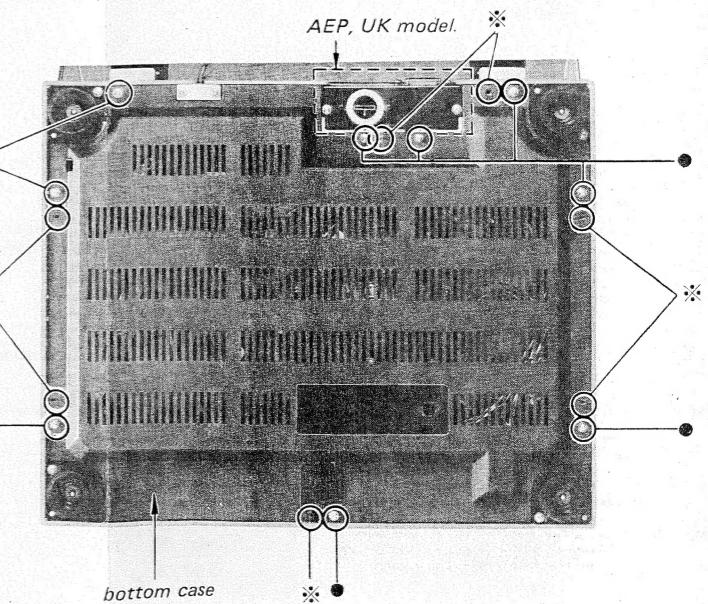
Note:  
When the turntable platter is placed to the turntable shaft, keep the metallic part inside the white gear.

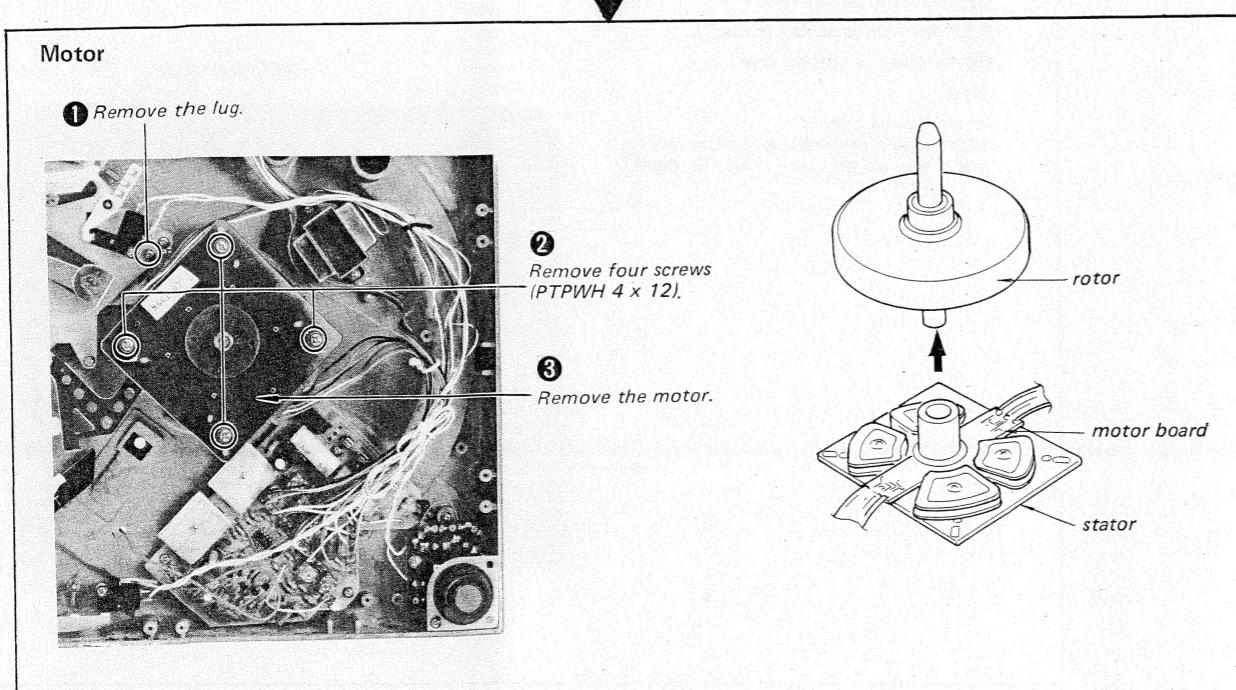
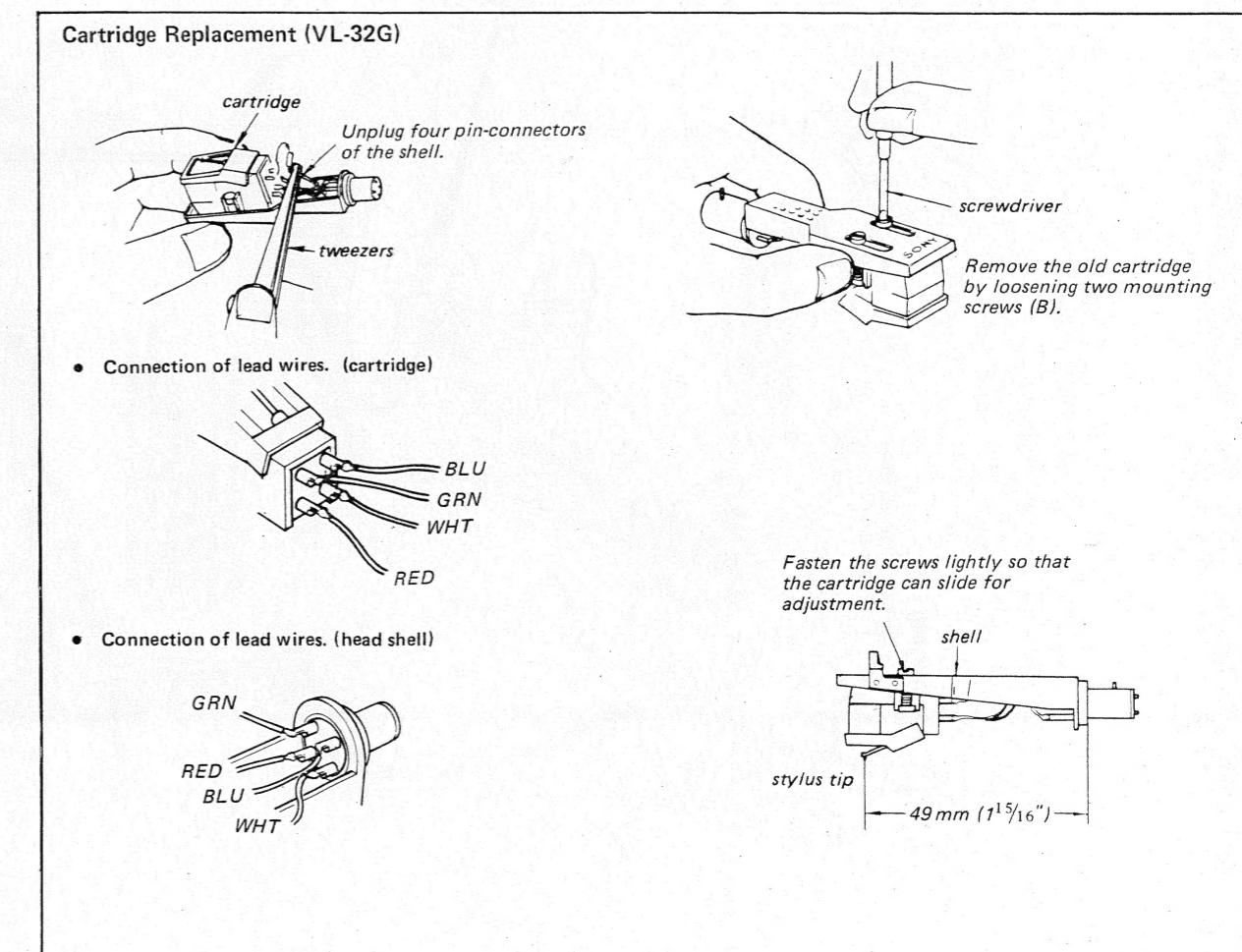
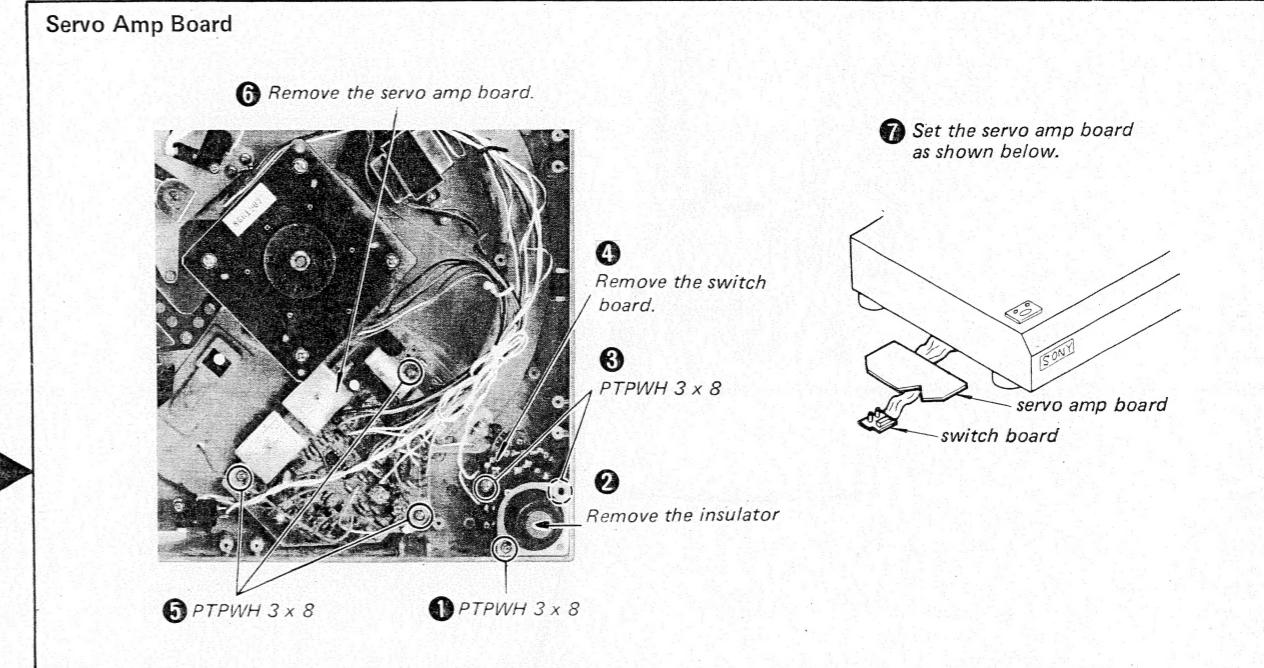
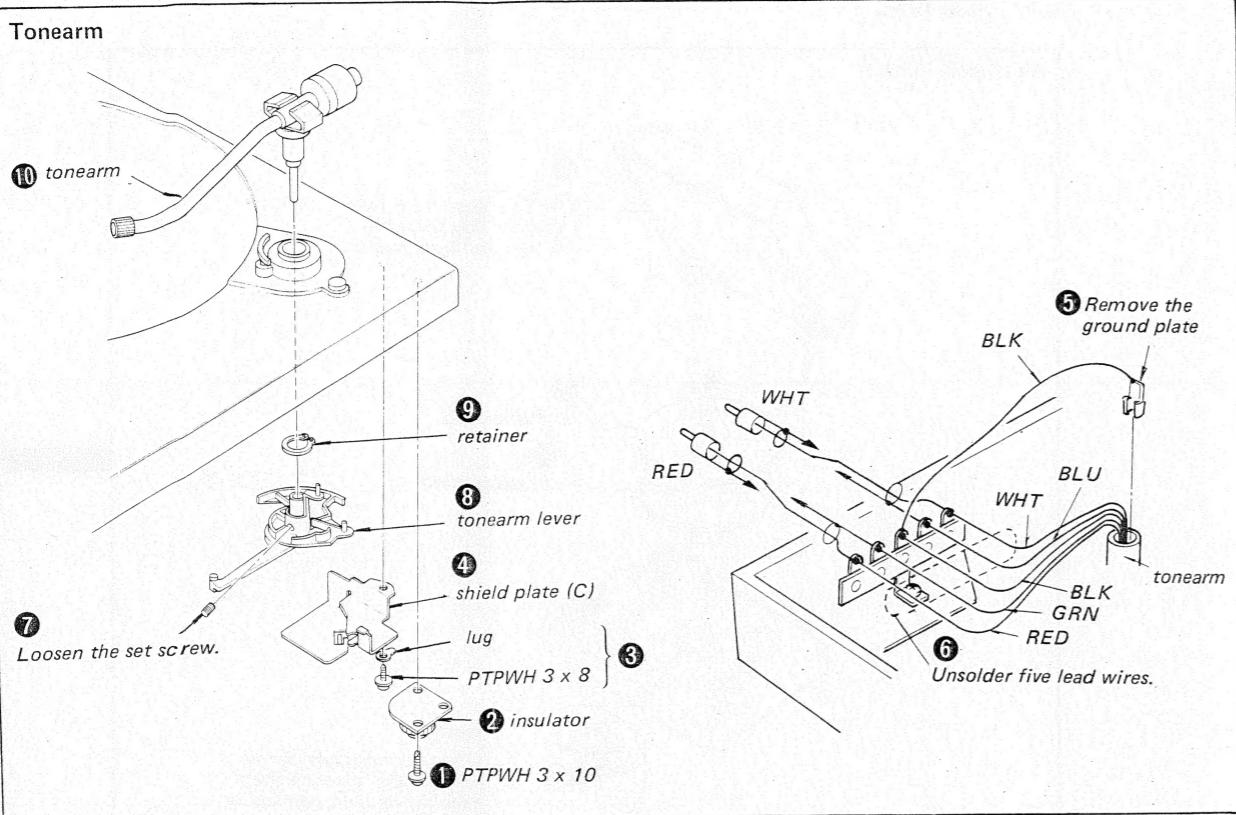
Bottom Case

- 1 Unplug the power cord.
- 2 Secure the tonearm to the arm rest.
- 3 Install the dust cover.
- 4 Remove nine screws (● mark).
- 5 Remove the bottom case.

Note:

● mark: spare holes  
If the screws (● mark) can not be secured, put them into the spare holes (※ mark).





## SECTION 3

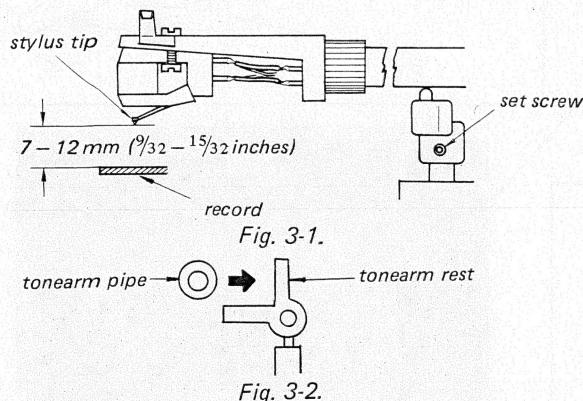
### ADJUSTMENTS

#### 3-1. MECHANICAL ADJUSTMENTS

##### Tonearm Height Adjustment

###### A). Automatic Return Operation

1. Bring the tonearm toward the inner of the record and put the stylus in the last groove of the record.
2. Slowly turn the turntable by hand to lift the tonearm.
3. Confirm that the clearance between the stylus tip and the record is 7 – 12 mm as shown in Fig. 3-1. If necessary, adjust the height of the arm lifter by loosening the set screw.
4. After the adjustment, confirm that the tonearm smoothly returns to the tonearm rest as shown in Fig. 3-2.



###### B). Manual Return Operation

1. Bring the tonearm to the desired position on the record.
2. Lift the cueing lever and confirm that the clearance between the stylus tip and the record is 7 – 12 mm as shown in Fig. 3-1. If necessary, bend the seesaw plate and adjust the height of the tonearm by turning the adjustment screw.

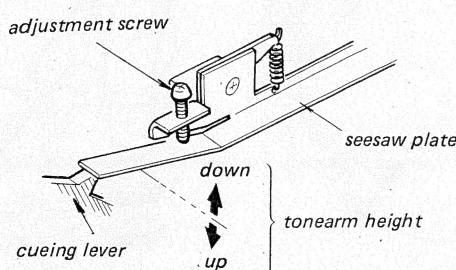


Fig. 3-3.

##### Automatic Return Position Adjustment

1. If the automatic return operation does not work properly, adjust by turning the adjustment screw as shown in Fig. 3-5.

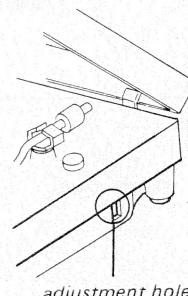


Fig. 3-4.

Turning direction	Automatic return position
1 (up)	slow
2 (down)	fast

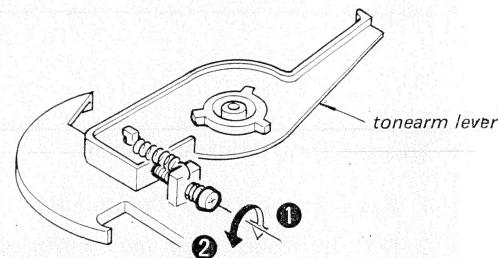
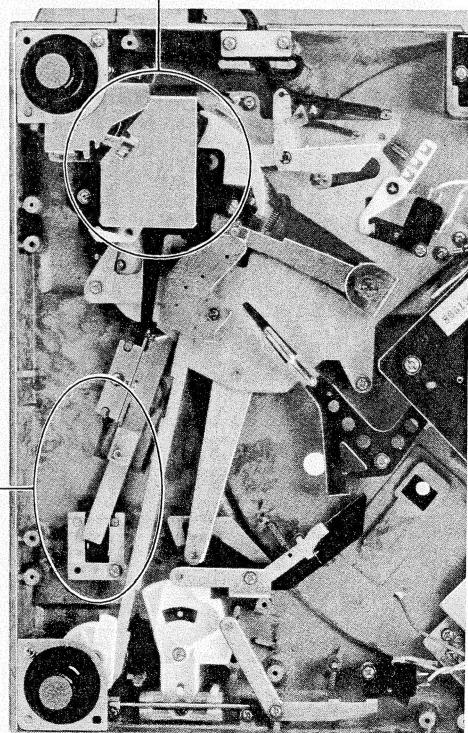
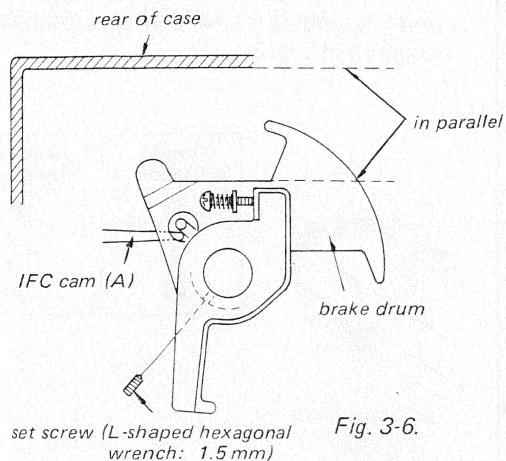


Fig. 3-5.

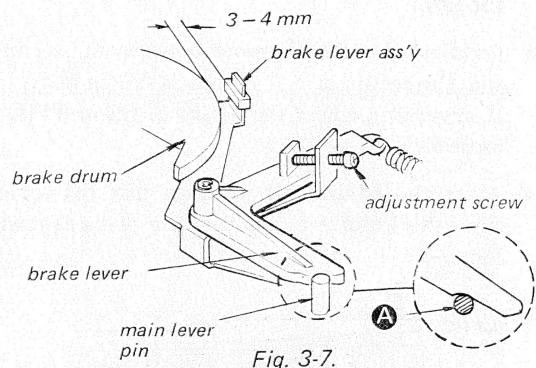


**Brake Drum Position Adjustment**

1. Secure the tonearm to the arm rest.
2. Adjust the position of the brake drum by loosening the set screw as shown in Fig. 3-6.

**Brake Lever Position Adjustment**

1. Rotate the drive gear by hand and set the main lever pin to the position **A**.
2. Turn the adjustment screw so that the clearance between the brake drum and the brake lever ass'y is 3 - 4 mm as shown below.
3. Then, turn the adjustment screw counterclockwise about  $\frac{1}{2}$  turns from the position obtained in step 2.

**Tonearm Drop-point Adjustment**

1. Bring the tonearm to the arm rest.
2. Start automatic play and confirm that the stylus lowers on a point approx. 1 mm out from the start point of the program.
3. If necessary, remove the rubber cap and turn the adjustment screw so that the stylus lowers on the correct drop point. (See Fig. 3-9.)

**Note:** Once it is properly adjusted with a 30 cm (12 inches) record, the drop point will be correct for 17 cm (7 inches) and 25 cm (10 inches) records as well.

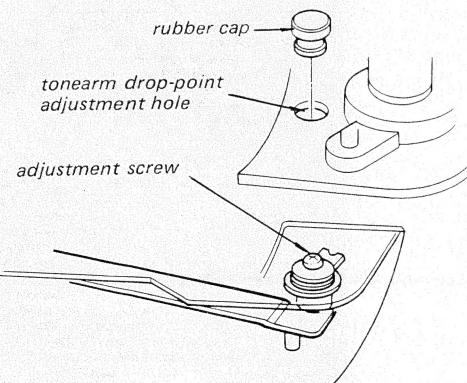
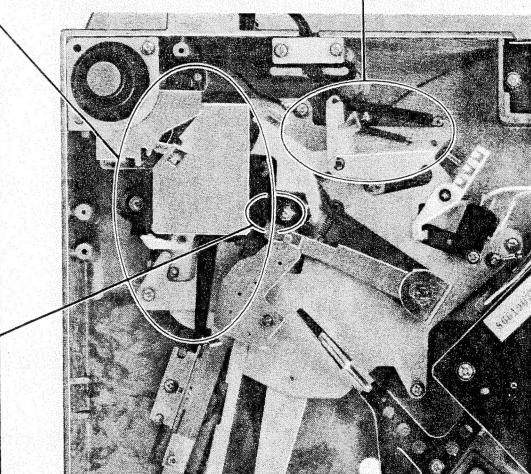


Fig. 3-8.

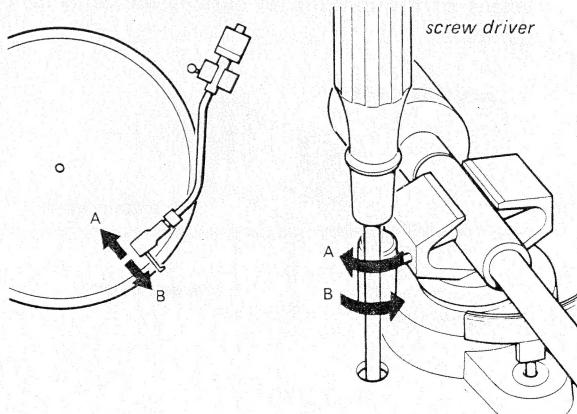
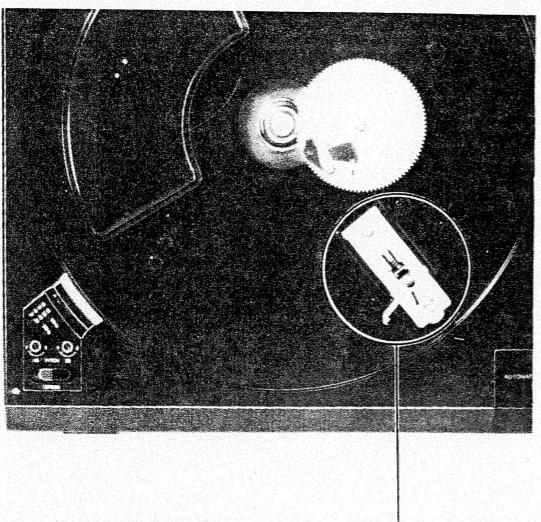


Fig. 3-9.



Speed Detecting Head Position Adjustment

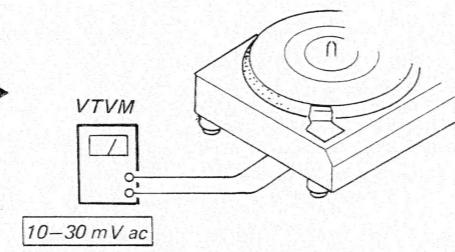
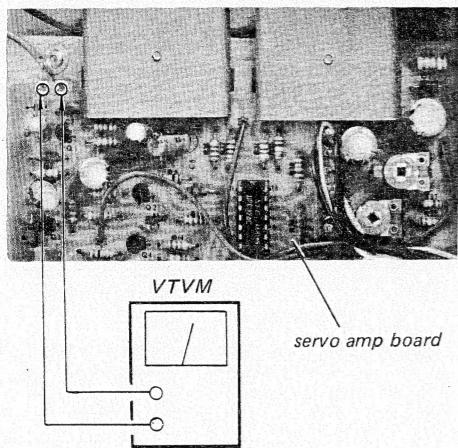


Fig. 3-10.

1. Remove the turntable platter.
2. Set the head deck as shown in Fig. 3-12.
3. Install the turntable platter.
4. Set the SPEED selector switch (S2) to 33 position.
5. Adjust the PITCH control (33) so that the stroboscope pattern appears stationary.
6. Confirm that the VTVM reads 10 - 30 mV ac. If necessary, adjust the position of the head deck by loosening the adjustment screw.

**Note:** Confirm that the head does not touch the turntable platter.

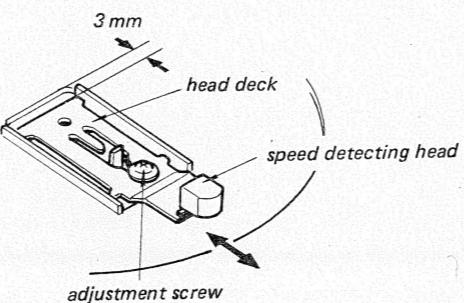


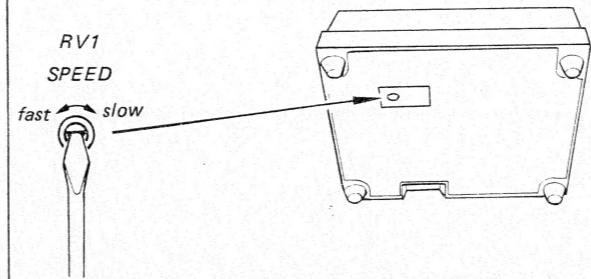
Fig. 3-12.

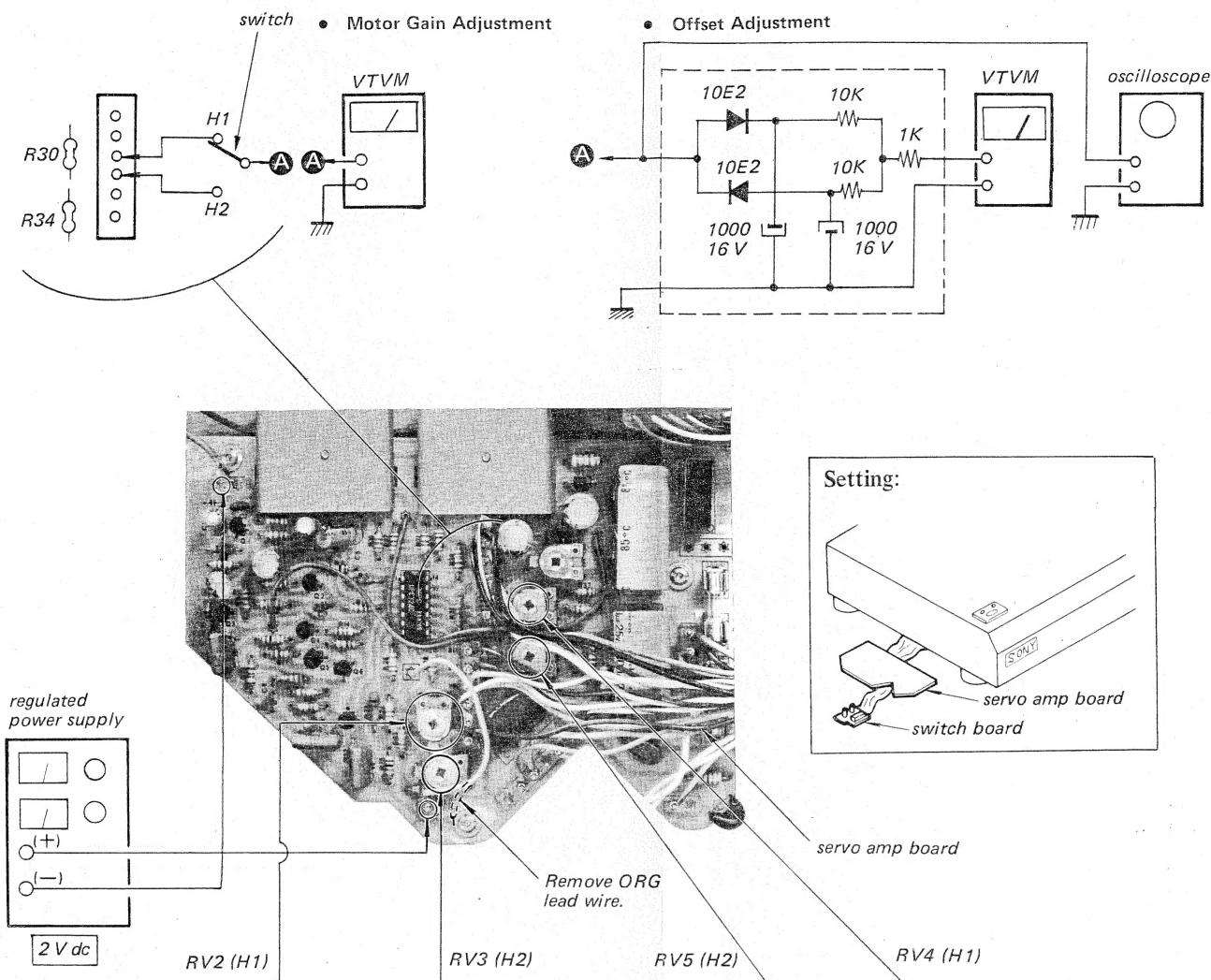
### 3-2. ELECTRICAL ADJUSTMENTS

#### Turntable Speed Adjustment

If correct speed cannot be obtained by adjusting the PITCH controls, adjust RV1.

1. Set the two PITCH control knobs (33 and 45) to the mechanical-mid position.
2. Set the SPEED selector switch to "33" or "45" position and adjust RV1 so that the stroboscope pattern appears stationary.





#### Motor Gain Adjustment

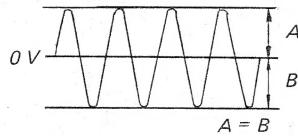
1. Turn the switch to H1 position and adjust RV2 for 2.3 Vdc VTVM reading.
2. Turn the switch to H2 position and adjust RV3 for 2.3 Vac VTVM reading.

#### Offset Adjustment

**Note:** Offset means the unbalanced voltages of the hall element and IC. When the offset voltage has changed, it causes the wow and flutter.

1. Turn the switch to H1 position and adjust RV4 for 0 V dc VTVM reading or the waveform on oscilloscope shown below.
2. Turn the switch to H2 position and adjust RV5 for 0 V dc VTVM reading or the waveform on oscilloscope shown below.

#### Waveform on oscilloscope



## SECTION 4

## DIAGRAMS

#### 4-1. MOUNTING DIAGRAMS

— Conductor Side —

- Replacement Semiconductors

For replacement, use semiconductors except in ( ).

Q1-5, 7: 2SC634A (2SC945)

Q6: 2SA678 (2SA733)

Q8, 10: 2SC1061

Q9, 11: 2SA671 (2SA755)

D1: S1RB10

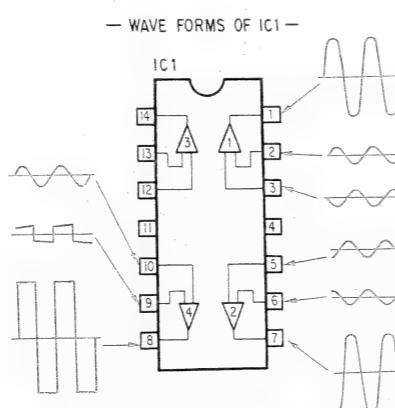
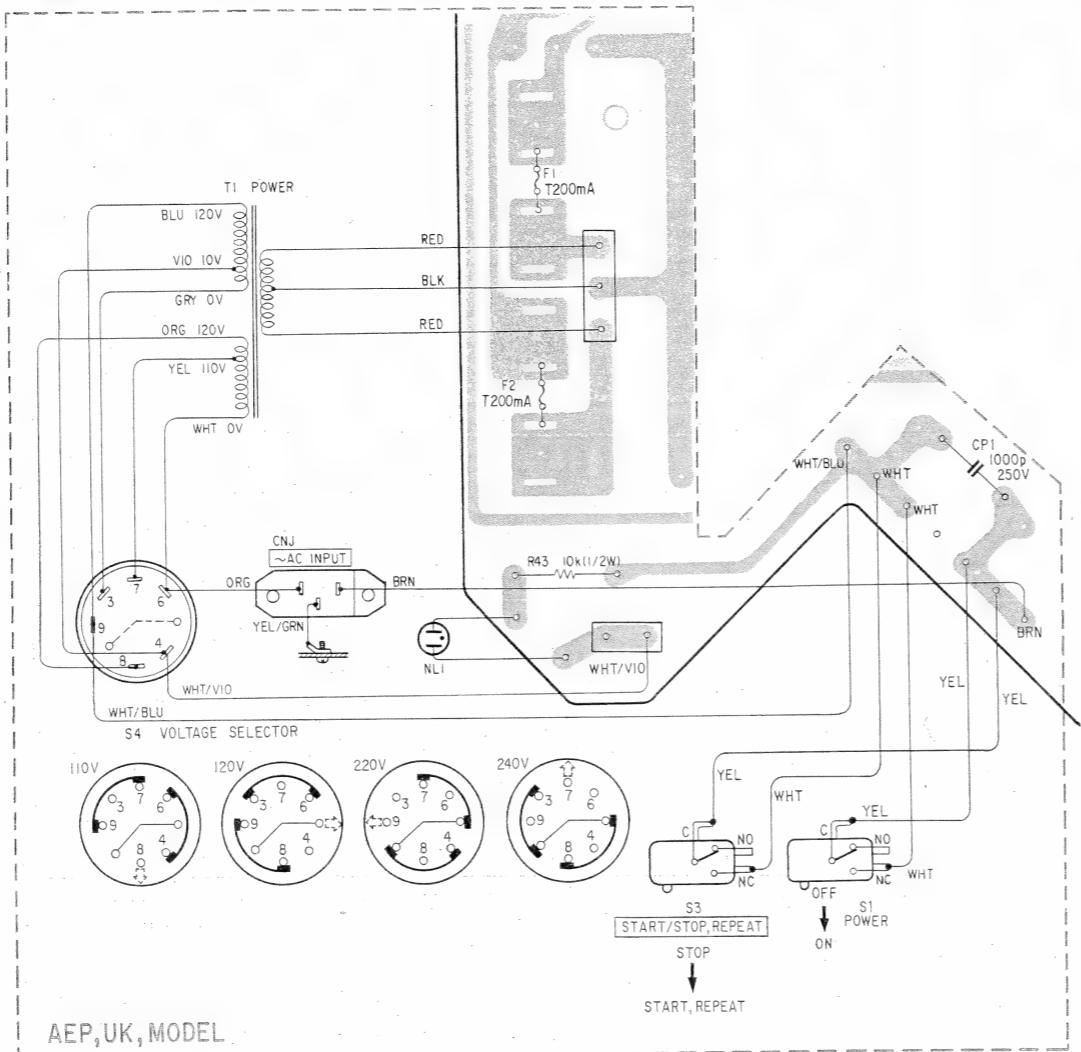
R2-3: EOB01-13 (EOA01-13B) D4

IC1: μPC324C

Diagram of a 14-pin integrated circuit package with pin numbers 1 through 14 labeled below it.

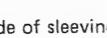
Н1-3: VHF 510

A diagram of a propeller assembly. It consists of a central hub with a propeller blade attached. A vertical line extends downwards from the hub, with the word 'TOP' written above it, indicating the orientation of the propeller.

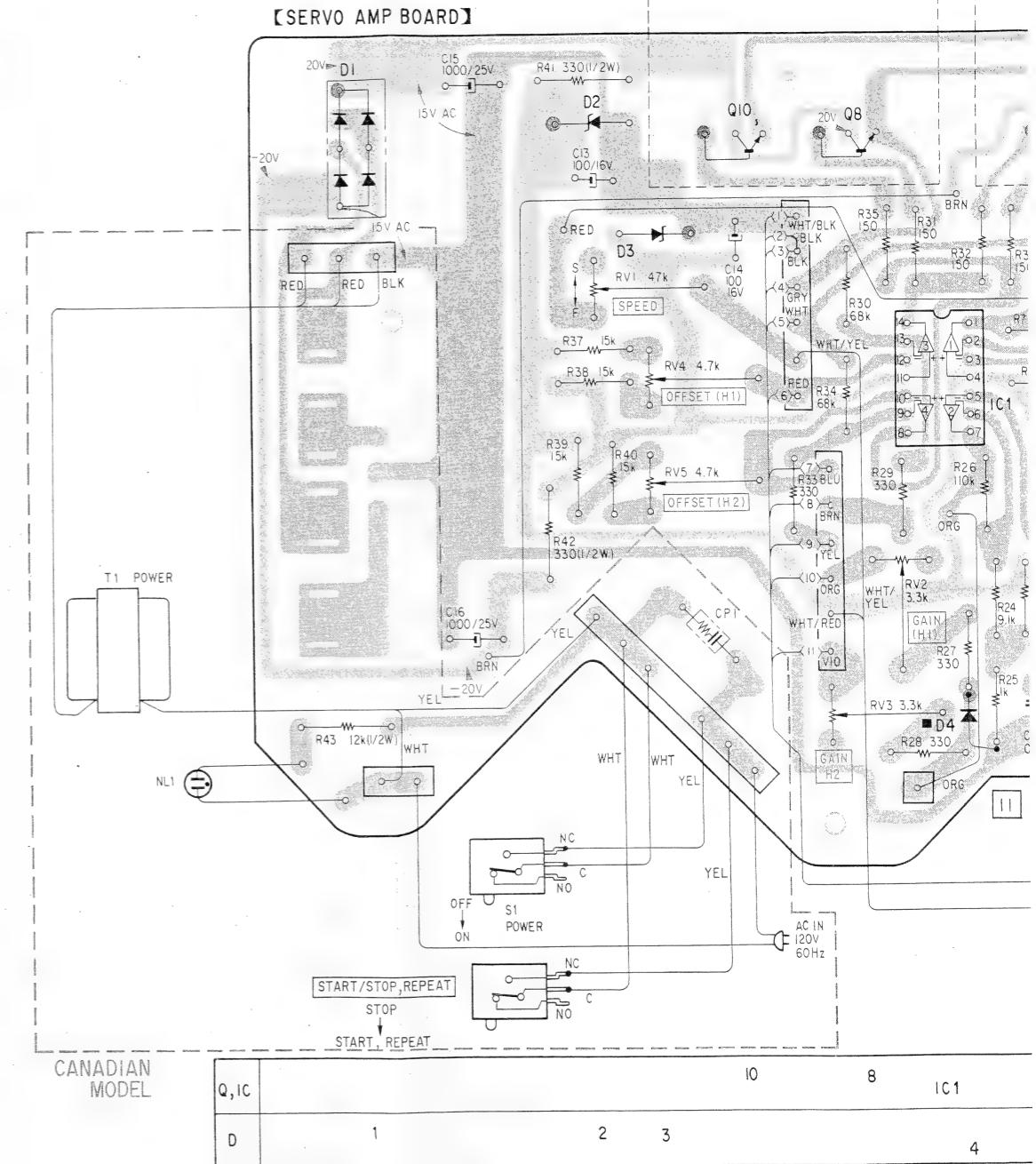


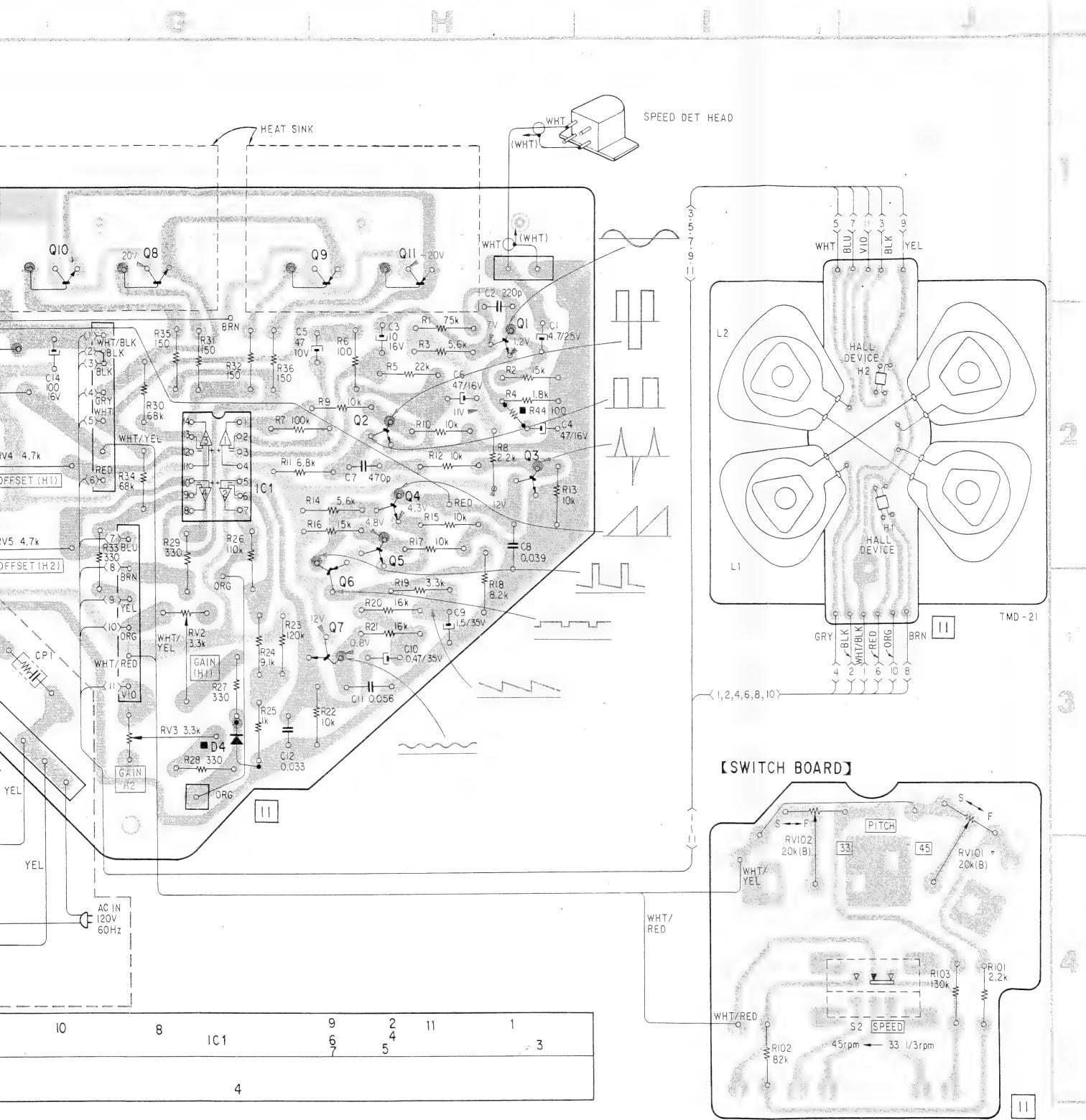
**Note:**

- Color code of sleevng over the end of the jacket.

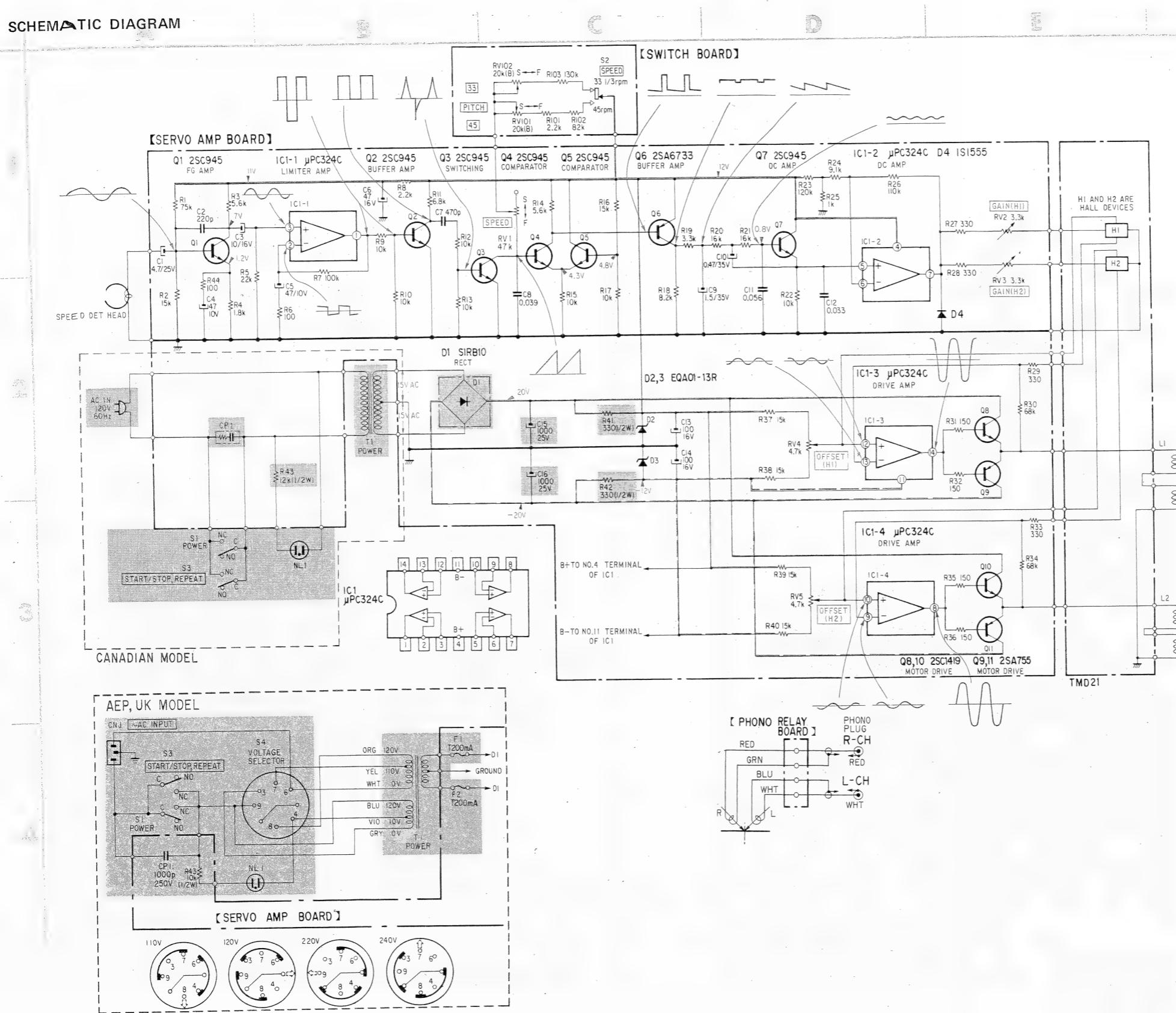


- : part mounted on the conductor side.
- : B+ pattern
- : B- pattern
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken with a VOM (20 kΩ/V).  
SPEED selector switch:  $33\frac{1}{3}$  rpm.





## 4-2. SCHEMATIC DIAGRAM



## Note:

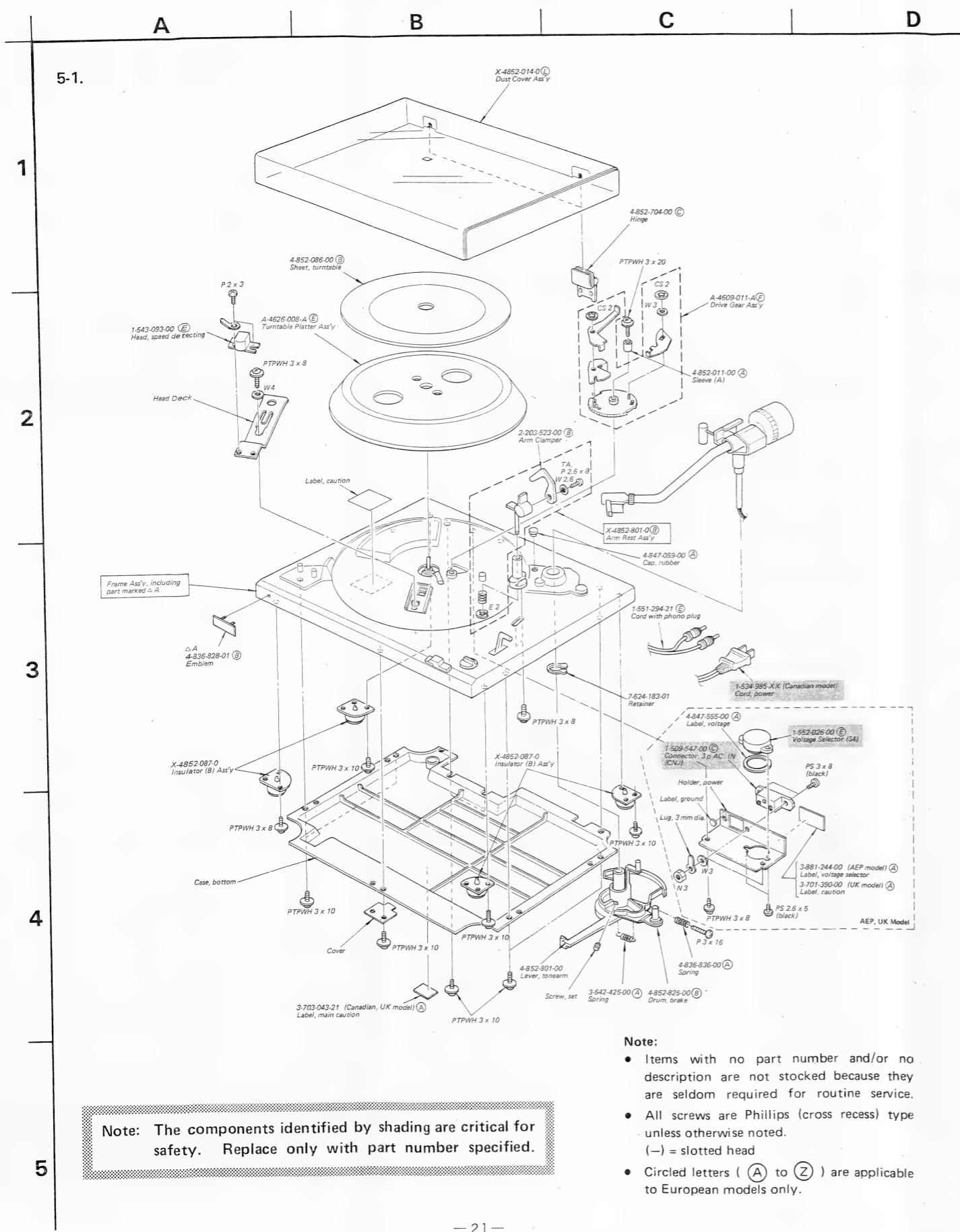
- All capacitors are in  $\mu\text{F}$  unless otherwise noted.  $\text{pF} = \mu\text{pF}$
- 50  $\text{WV}$  or less are not indicated except for electrolytics.
- All resistors are in ohms,  $\frac{1}{4}\text{W}$  unless otherwise noted.  $\text{k}\Omega = 1000\Omega$ ,  $\text{M}\Omega = 1000\text{k}\Omega$
- Panel designation.
- Adjustment for repair.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken with a VOM (20  $\text{k}\Omega/\text{V}$ ).
- SPEED selector switch: 33 1/3 rpm.
- $\text{---}$ : B+ bus.
- $\text{---}$ : B- bus.
- Switch

Ref. No.	Switch	Position
S1	POWER	OFF
S2	SPEED	33 1/3 rpm
S3	START/STOP, REPEAT	STOP
S4	VOLTAGE SELECTOR	—

Note: The components identified by shading are critical for safety. Replace only with part number specified.

## SECTION 5

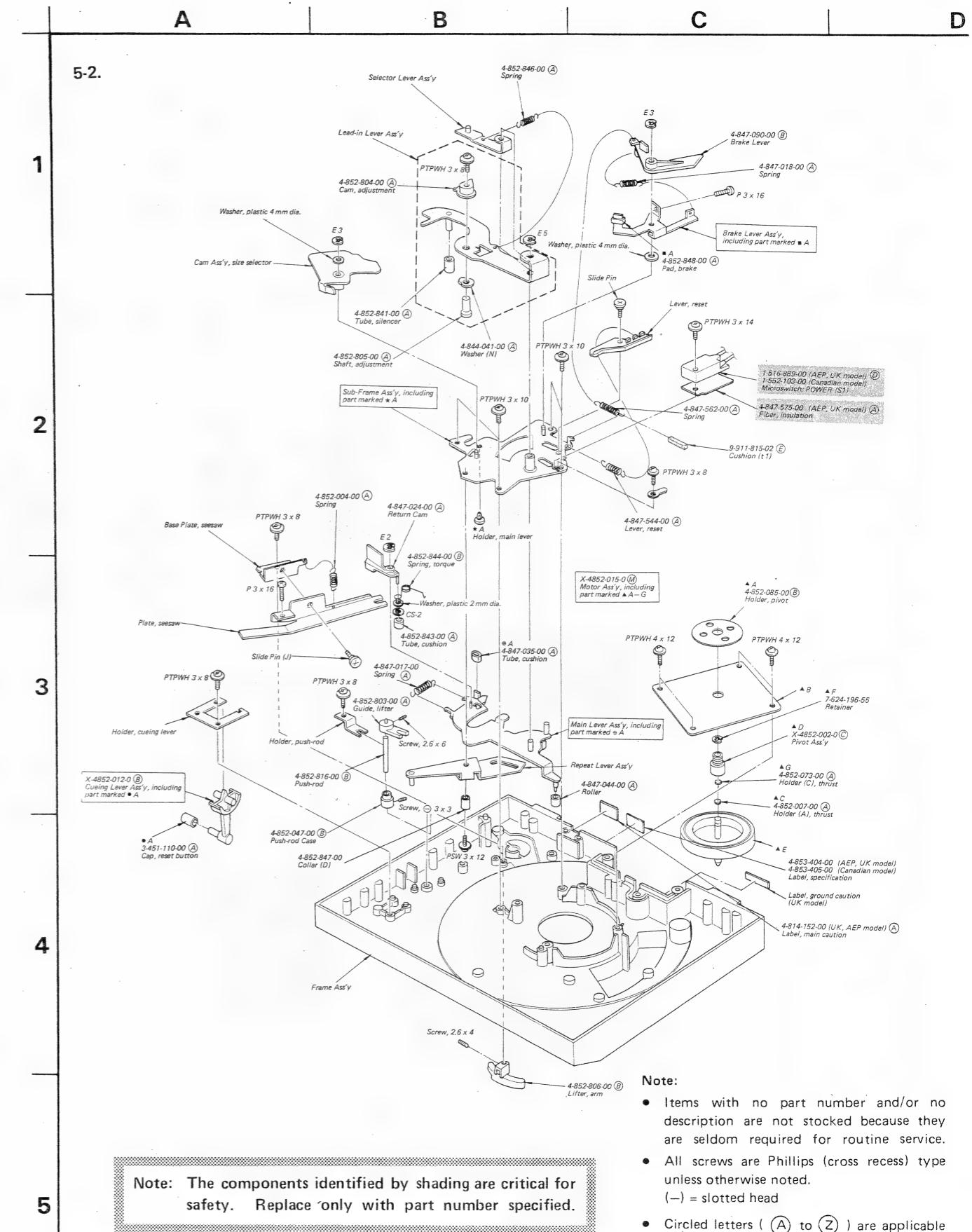
## EXPLODED VIEWS



Note: The components identified by shading are critical for safety. Replace only with part number specified.

### Note

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.  
(-) = slotted head
- Circled letters ( A ) to ( Z ) are applicable to European models only.



Note: The components identified by shading are critical for safety. Replace only with part number specified.

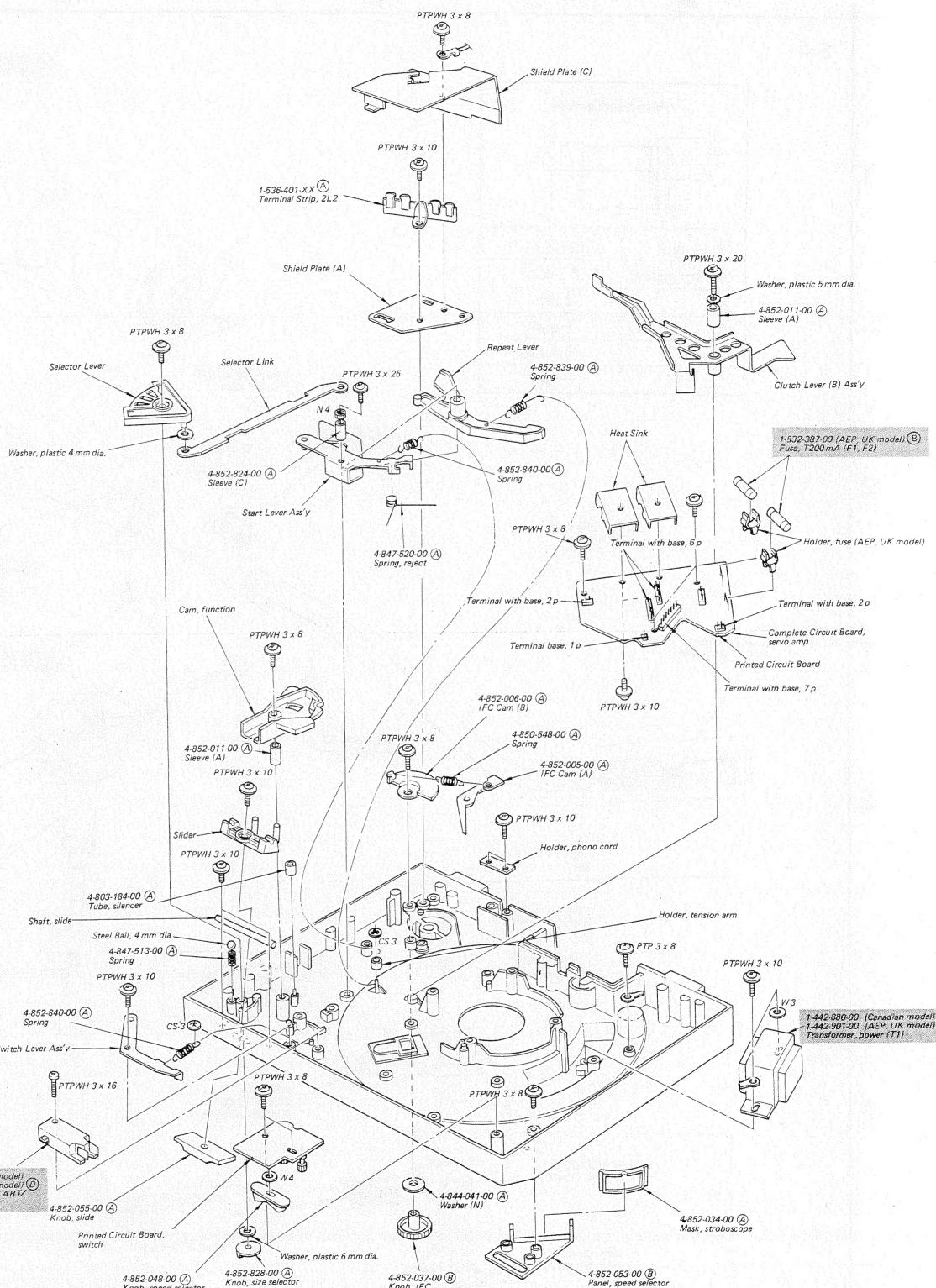
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A B C D

5-3.

1



5

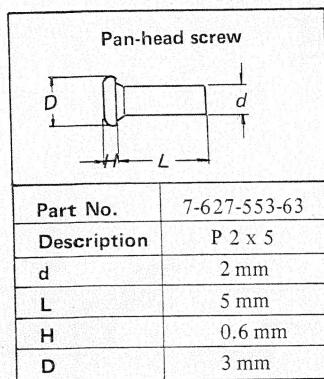
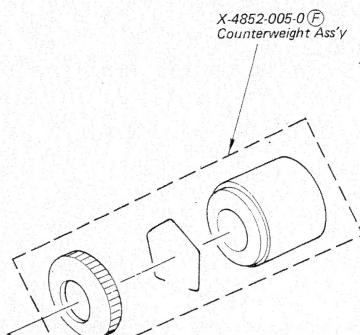
Note: The components identified by shading are critical for safety. Replace only with part number specified.

## Note:

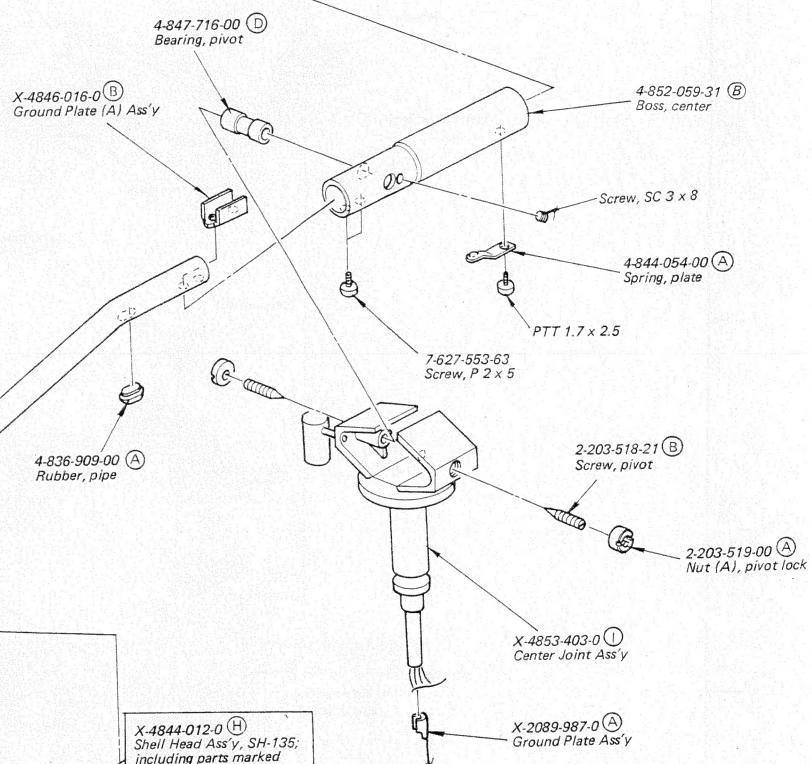
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A B C D

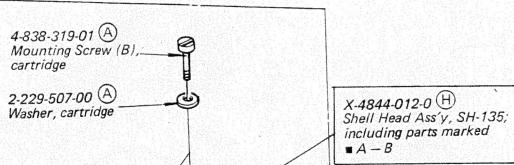
5-4.

X-4852-005-0 (F)  
Counterweight Ass'y

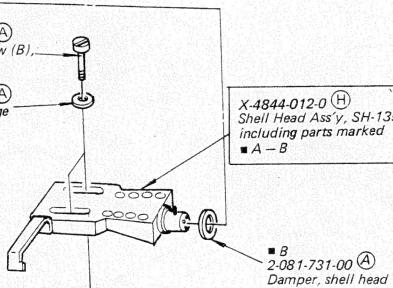
1



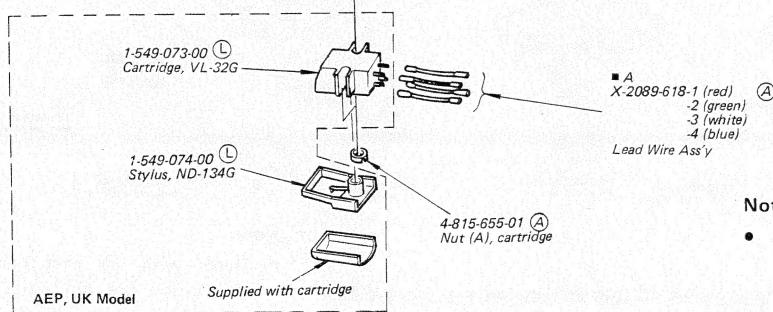
2



3



4



5

**Note:**

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
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(-) = slotted head
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## SECTION 6

## ELECTRICAL PARTS LIST

Note: Circled letters (A) to (Z) are applicable to European models only.

Ref. No.	Part No.	Description
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**SEMICONDUCTORS****Transistors**

- ⇒ Q1 - 5 (B) 2SC634A
- ⇒ Q6 (C) 2SA678
- ⇒ Q7 (B) 2SC634A
- ⇒ Q8 (D) 2SC1061
- ⇒ Q9 (E) 2SA671
- ⇒ Q10 (D) 2SC1061
- ⇒ Q11 (E) 2SA671

**IC**

- IC1 (G) μPC324C

**Diodes**

- D1 (C) S1RB10
- ⇒ D2, 3 (B) EQB01-13
- D4 (B) 1S1555

**Hall Element**

- H1, 2 (D) VHE-510

**TRANSFORMERS**

- T1 1-442-880-00 Power (Canadian model)
- 1-442-901-00 (J) Power (AEP, UK model)

**CAPACITORS**

All capacitors are in  $\mu\text{F}$  and ceramic unless otherwise noted. 50WV or less are not indicated except for electrolytics.

pF =  $\mu\mu\text{F}$ , elect = electrolytic

- C1 1-121-395-11 (A) 4.7 25 V elect
- C2 1-102-110-11 (A) 220 p
- C3 1-121-651-11 (A) 10 16 V elect
- C4, 5 1-121-352-11 (A) 47 10 V elect
- C6 1-121-409-11 (A) 47 16 V elect
- C7 1-102-114-11 (A) 470 p
- C8 1-108-811-12 (B) 0.039 mylar
- C9 1-131-216-11 (B) 1.5 35 V tantalum

⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

Note: The components identified by shading are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description
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- C10 1-131-213-11 (B) 0.47 35 V tantalum
- C11 1-108-813-12 (B) 0.056 mylar
- C12 1-108-810-12 (B) 0.033 mylar
- C13, 14 1-121-415-11 (A) 100 16 V elect
- C15, 16 1-121-657-11 (B) 1000 25 V elect

**RESISTORS**

All resistors are in ohms. Common  $\frac{1}{4}\text{W}$  carbon resistors are omitted. Check schematic diagram for values.

- R41, 42 1-244-861-11 (A) 330  $\frac{1}{2}\text{W}$
- 1-244-897-11 (A) 10 k  $\frac{1}{2}\text{W}$  (AEP, UK model)
- R43 1-244-899-11 12 k  $\frac{1}{2}\text{W}$  (Canadian model)

- RV1 1-224-647-XX (B) 47 k, adjustable
- ⇒ RV2, 3 1-224-644-XX (B) 4.7 k, adjustable
- RV4, 5 1-224-644-XX (B) 4.7 k, adjustable

- RV101, 102 1-226-062-00 (B) 20 k, variable, PITCH

**SWITCHES**

- S1 1-516-889-00 (D) Micro, power (AEP, UK model)  
(1-552-103-00 Micro, power (Canadian model))
- S2 1-552-123-00 (B) Lever Slide, SPEED
- S3 1-516-657-11 Micro, START/STOP, REPEAT (Canadian model)  
1-516-889-00 (D) Micro, START/STOP, REPEAT (AEP, UK model)
- S4 1-552-026-00 (E) Voltage Selector (AEP, UK model)

**MISCELLANEOUS**

- CNJ 1-509-547-00 (C) Connector, 3-p; AC IN (AEP, UK model)
- CP1 1-102-222-21 (A) Capacitor, ceramic; 1000 p 250V (AEP, UK model)
- 1-231-326-00 Encapsulated Component (Canadian model)
- F1, 2 1-532-387-00 (B) Fuse, T200 mA (AEP, UK model)
- NL1 1-519-135-11 (C) Lamp, neon
- 1-534-985-XX Cord, power (Canadian model)
- 1-536-401-XX (A) Terminal Strip
- 1-543-093-00 (E) Head, speed detecting
- 1-549-073-00 (L) Cartridge, VL-32G (AEP, UK model)
- 1-549-074-00 (L) Stylus, ND-134G (AEP, UK model)
- 1-551-294-21 (E) Cord, w/phono plug
- 1-561-013-11 (E) Connector, shell head

Note: Circled letters (A) to (Z) are applicable to European models only.

### ACCESSORIES & PACKING MATERIALS

<u>Part No.</u>	<u>Description</u>	<u>Part No.</u>	<u>Description</u>
X-4844-012-0	(H) Shell Head Ass'y, SH-135 including:	3-701-632-00	(A) Bag, plastic; accessory
2-081-731-00	(A) Dumper, shell head	3-701-634-00	(A) Bag, plastic; turntable platter
X-2089-618-1	(A) Lead Wire Ass'y (red)	3-701-806-01	(A) Adaptor, 45 rpm
X-2089-618-2	(A) Lead Wire Ass'y (green)	3-770-324-11	(E) Manual, instruction (AEP, UK model)
X-2089-618-3	(A) Lead Wire Ass'y (white)	3-770-324-31	Manual, instruction (Canadian model)
X-2089-618-4	(A) Lead Wire Ass'y (blue)	3-793-395-11	(A) Gauge, overhang adjustment
1-534-819-00	(G) Cord, power (UK model)	4-815-655-01	(A) Nut (A), cartridge
2-054-619-00	(A) Spacer, cartridge	4-838-319-01	(A) Mounting screw (B), cartridge
2-054-624-01	Screw (B), cartridge (Canadian model)	4-843-577-00	(A) Sheet, protection; dust cover
2-054-625-00	Screw (C), cartridge (Canadian model)	4-847-092-00	(C) Screwdriver
3-701-438-21	Washer, plastic 2.5 mm dia. (Canadian model)	4-847-314-00	(C) Bag, plastic; set
3-701-613-00	Bag, plastic; screws (Canadian model)	4-852-077-00	(A) Protector, counterweight
3-701-616-00	(A) Bag, plastic; counterweight	4-852-078-00	(B) Holder, turntable platter
3-701-623-00	(A) Bag, plastic; power cord (UK model)	4-852-080-00	(B) Cushion, upper
		4-852-081-00	(B) Cushion, lower
		4-852-204-00	(A) Spacer
		4-853-406-00	(G) Carton

Note: The components identified by shading are critical for safety. Replace only with part number specified.

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